CHAPTER 16

Supplements and sports foods

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16.5.2 Supplements in Group B of the AIS Sports Supplement Program

According to the AIS Sports Supplement Program, some supplements enjoy preliminary data that are supportive of performance benefits or hypotheses that strongly suggest such benefits. However, this information is not sufficient to be sure of a positive outcome, nor to define the situations and protocols that would achieve an optimal result. Because these supplements are of interest to athletes and coaches, they should be prioritised for additional research to either confirm their value to athletes or downgrade the interest.

16.5.2.1 **Colostrum**

Colostrum is a protein-rich substance secreted in breast milk in the first few days after a mother has given birth. It is high in immunoglobulins and insulin-like growth factors (IGFs). Unlike the adult gut, the gut of a baby has ‘leaky’ junctions that allows it to absorb whole proteins including immunoglobulins, thus developing the immuno-competence needed to survive outside the uterus.

A number of companies have developed supplements rich in bovine colostrum (colostrum derived from cows) for use by humans. In 1997, attention was focused on these products after a study reported that sprinters and jumpers who consumed a colostrum supplement (Bioenervie™) for 8 days while undertaking resistance and speed training experienced an increase in plasma IGF-1 levels (Mero et al. 1997). Although supplementation failed to improve vertical jump performance in these athletes, the study raised several intriguing issues. First, it appeared to show that humans could absorb intact proteins from a supplement and, second, it appeared to show that colostrum could provide a dietary source of IGF, an anabolic hormone the intentional intake of which is banned by WADA. Subsequent discussion of this paper suggested that the increase in IGF concentrations was spurious, caused by inaccurate techniques for measuring these growth factors. However, a follow-up study by this group (Mero et al. 2002) reported an increase in plasma IGF-1 following supplementation with another colostrum product (Dynamic™). In this follow-up study, gel electrophoresis techniques showed that there was little direct absorption of IGF-1 from the oral supplement. This suggests that the intake of colostrum stimulated endogenous production of growth factors. Nevertheless, other studies have failed to demonstrate any change in IGF-1 levels in response to colostrum supplementation (Buckley et al. 2002; Kuipers et al. 2002). There are also inconsistencies in effect of colostrum supplementation on immune parameters, with various studies showing either an increase (Mero et al. 2002) or no change (Mero et al. 1997) in salivary

immunoglobulin A (IgA). One study has reported a reduction in the self-reported symptoms of upper respiratory tract infections following colostrum supplementation in a large group of subjects (Brinkworth & Buckley 2003); this finding warrants further investigation.

A number of studies have investigated the chronic effects of supplementation with colostrum products, particularly an Australian product (Intact™), on the outcome of training programs undertaken by both trained and previously untrained subjects. The results of these studies are summarised in Table 16.7. Buckley and colleagues studied the effects of 8 weeks of running training (3 × 45 minutes/week) in combination with 60g/day of colostrum powder or a whey placebo in two groups of previously untrained men (Buckley et al. 2002). The test set, consisting of two incremental treadmill runs to exhaustion, with a 20-minute recovery interval, was undertaken at 0, 4 and 8 weeks. The study found that after 8 weeks the treatment group completed more work and ran further in the second of two treadmill runs than subjects in the placebo group. However, no differences were seen at 4 weeks, and no measurements were taken to explain the performance improvements seen in the second run at 8 weeks. Another study involving trained cyclists (Coombes et al. 2002) also used a protocol involving two incremental tests to exhaustion separated by 20 minutes. In contrast to the results of the previous study, neither the colostrum nor the placebo groups improved their cycling 'max test' performance in either of the two tests after 4 or 8 weeks of supplementation with colostrum. However, another measure of performance was undertaken by these cyclists on a separate day, in the form of a submaximal ride followed by a time trial. In this protocol, cyclists who had received colostrum recorded a greater improvement in the performance of the time trial at week 8 compared with those who had received a placebo. Again, there were no mechanisms to explain this enhancement of performance.

In several other studies, there have been reports of an enhancement of the performance of the treatment group compared with the group taking a placebo product. However, there is inconsistency in the literature, with one study reporting an improvement in vertical jump in previously untrained subjects who undertook plyometric and resistance training (Buckley et al. 2003) and others finding no enhancement in vertical jump in highly trained team sport players (Hofman et al. 2002) or track and field athletes (Mero et al. 1997). Similarly, colostrum supplementation has been reported to enhance the improvement in sprint performance in one study of previously untrained men (Buckley et al. 2003), while failing to alter this outcome in trained team sport athletes (Hofman et al. 2002). Reports of the changes in body composition have also showed inconsistencies. While one study has reported an increase in lean body mass following a period of colostrum

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supplementation (Antonio et al. 2001), other studies have found no changes in body mass or body composition (Hofman et al. 2002). The finding that a colostrum-supplemented group showed an increase in subcutaneous fat and skin thickness in their arms following resistance training is curious (Brinkworth et al. 2004). The only consistent findings from the present studies of colostrum supplementation are that there are no apparent benefits to the outcomes of resistance training (Antonio et al. 2001; Buckley et al. 2003; Brinkworth et al. 2004), and that when benefits are detected, they are apparent only after more than 4 weeks of treatment (Buckley et al. 2002, 2003).

The results of the current literature have been aggressively marketed by the manufacturers of colostrum supplements. Claims include enhanced recovery, superior muscle buffering capacity and increased growth of muscle contractile proteins. Furthermore, the benefits have been transferred from athletes to other groups including manual workers and sufferers of chronic fatigue. Although the observations of enhanced training or performance outcomes are of real interest to athletes and coaches, there are several explanations for the reluctance of most sports scientists to consider colostrum as a proven ergogenic aid. The inconsistency of the literature is problematic, even when the difficulties of detecting small changes in performance are taken into account. The lack of a plausible hypothesis to explain how colostrum might enhance the response to exercise is also an important absence. Not only is there a lack of support for the current observations, but, without a possible mechanism to explore or exploit, there are difficulties in identifying the type of athletes or situations of exercise that might benefit from colostrum supplementation. Whether all colostrum supplements are of equal quality or efficacy is also a concern.

Finally, colostrum is an expensive supplement. The typical dose provided to subjects in the current studies is 60 g per day, which would cost about A$70 per week to purchase at retail rates. In light of this expense, and the suggestion that it may take up to 8 weeks to provide a detectable outcome, greater levels of support for colostrum are needed before it can pass a cost-benefit analysis.